The Actuarial Profession
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Strategic Asset Allocation and Solvency II

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SAA for P&C Insurer and Solvency II

Objective

- Efficient SAA for a P&C insurer in the context of Solvency II

Approach

- Minimize required economic capital for each target return
- Cost / benefit of imposing a Solvency II constraint to the SAA

Results

- Optimal SAA benefits from diversifying sources of risk
  - Corporate credit
  - Interest rate duration
  - Equity, real estate, and alternatives

Outline

- **SAA Process**
    - ❶ Objectives and Constraints
    - ❷ Asset Universe and Assumptions
    - ❸ Liability Profile
    - ❹ SAA Results
    - ❺ Impact of Solvency II on SAA

- **Appendix: Assumptions**

❶ Liability Driven Constraints

Liability Characteristics

- Hypothetical P&C insurer
- Constraints: ALM matching needs, duration, liquidity needs

Characteristics	P&C
Liability Stability	Low
Liquidity Needs	High
ALM Matching Needs	Low
Duration Target	2.4 yrs

Quantitative Constraints

- Risk appetite is based on tracking error relative to the liability benchmark allocation

| Characteristic	Modeled as…	P&C
Liquidity Needs	Cash Minimum	10%
Liquidity Needs	Cash + Govt + Equity Minimum	30%
ALM Matching Needs	Max Duration Mismatch	2.0 yrs
Risk Appetite	Max contrib. to TE from Equity	40%
Risk Appetite	Max contrib. to TE from Hedge Funds	40%
Risk Appetite	Max contrib. to TE from Real Estate	40%

❷ Asset Universe and Assumptions

- Expected return and volatility may include active management
- Volatility is calibrated to a 1-year half life
- Expected return is based on current market yield for bonds
- Return assumptions for public equity, real estate, and hedge funds from GSAM's equilibrium excess return assumptions

Investment Universe	Duration (yrs)	Current Assumptions		Assumes Active Mgmt
		Expected Return	Expected Volatility	
Cash	0.2	0.7%	0.1%	✗
Gilts 1-3	1.8	0.8%	1.1%	✗
Gilts 3-5	3.6	1.4%	2.6%	✗
Corp A+ 1-3	1.7	4.3%	2.5%	✓
Corp A+ 3-5	3.5	3.8%	3.8%	✓
Corp BBB 1-3	1.8	5.3%	3.7%	✓
Corp BBB 3-5	3.5	5.2%	5.3%	✓
Eq	0.0	8.0%	21.2%	✓
RE	0.0	6.2%	13.4%	✓
HF	0.0	6.8%	9.9%	✓

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❸ Liability Profile

Asset Class	Liability Benchmark Allocation	Starting Portfolio Allocation
Cash	24%	19%
Gilts	76%	34%
Corp A+	0%	34%
Corp BBB	0%	4%
Equities	0%	7%
Real Estate	0%	2%
Hedge Funds	0%	0%
Total	**100%**	**100%**
Assets	100	100
Required Capital	5	8.7
Available Capital	15	15
Excess Capital	10	6.3

- Excess Capital
- Required Capital
- Asset Value
- Liability
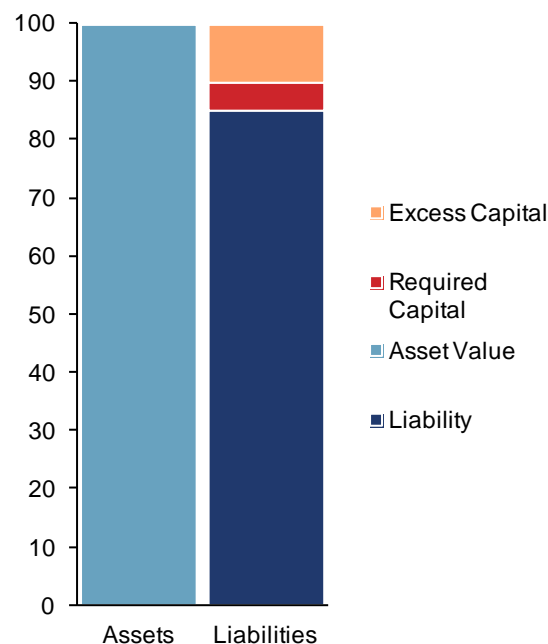
- Investing in the Liability Benchmark Allocation (LBA) results in required capital of 5bn, leaving 10bn of excess capital
- Marginal required capital needed if portfolio differs from LBA
- Marginal required capital and starting capital combine with an assumed 25% correlation

❹ SAA Using Current Market Assumptions
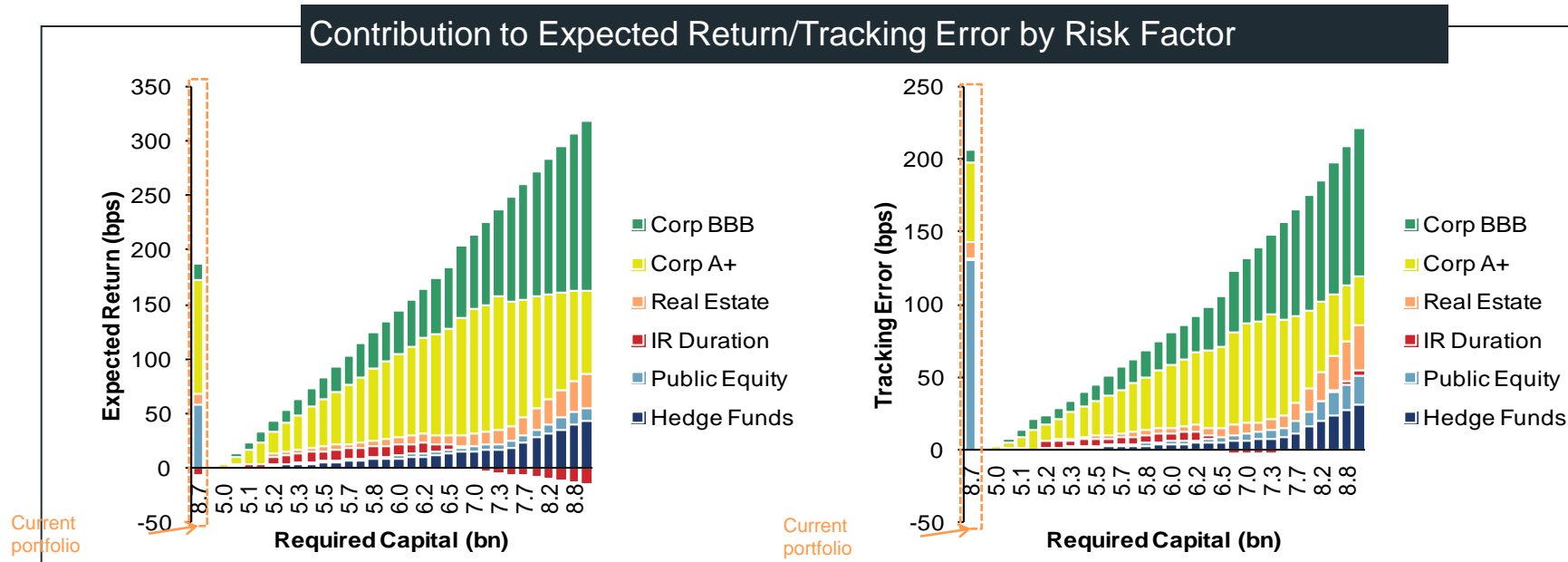## Optimal asset allocation across target expected return
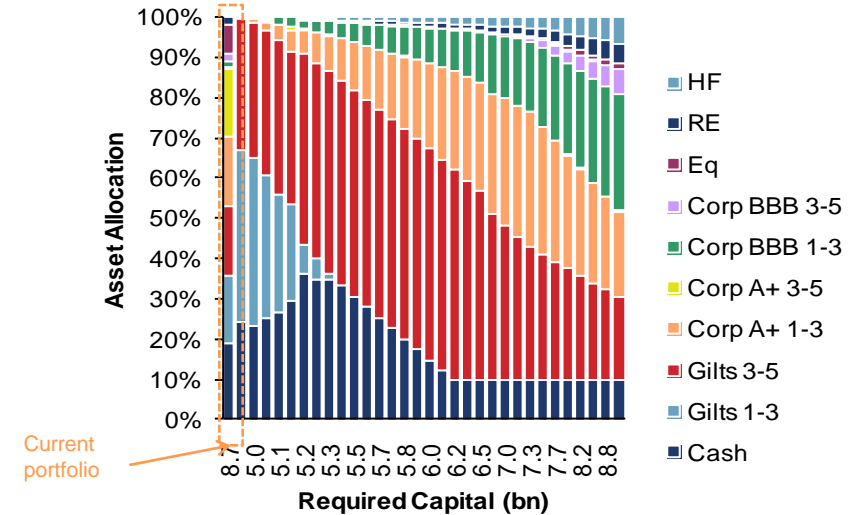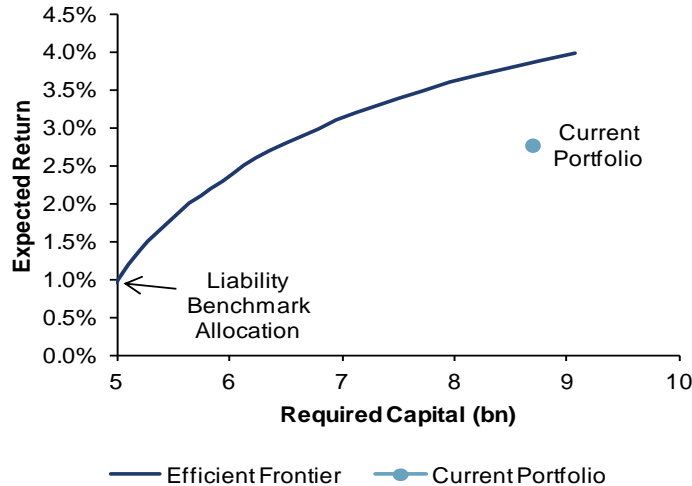
- Using 2.5bn of capital results in 240bps of additional expected return and a capital ratio of 15/7.5 = 2x
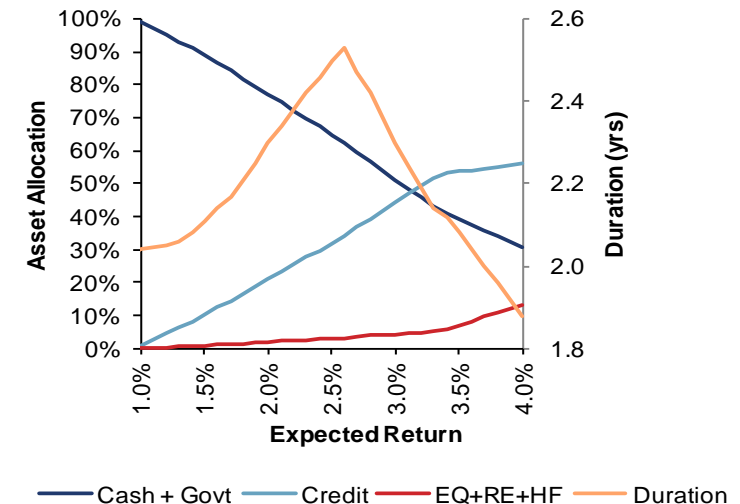
❹ SAA Using Current Market Assumptions
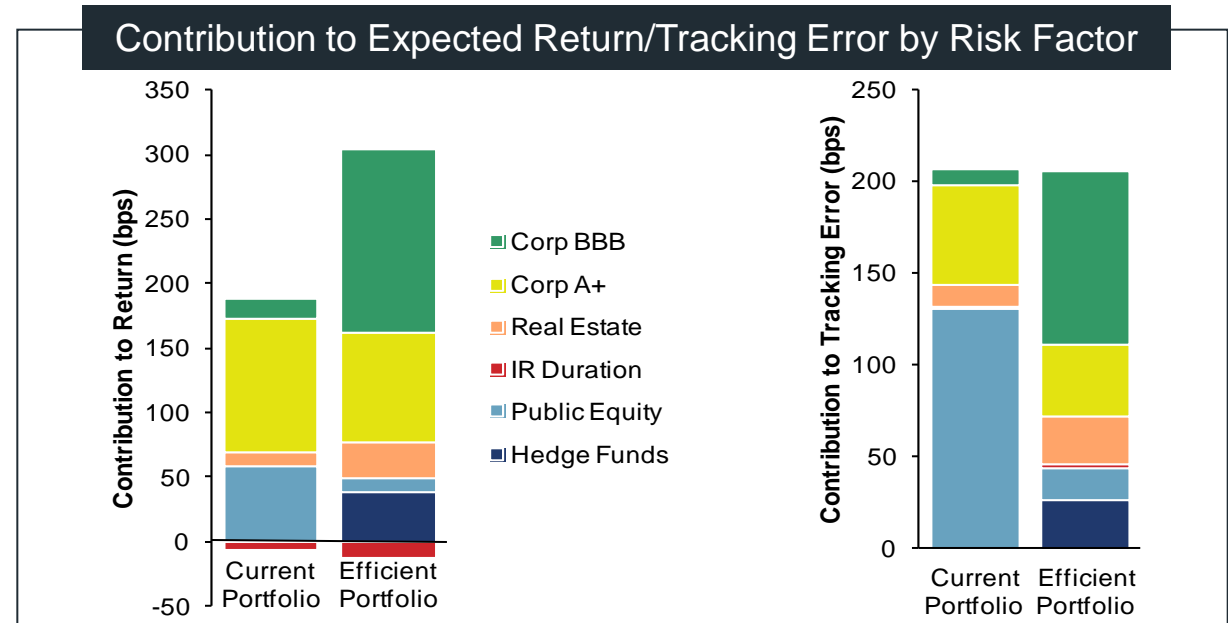## Sources of return and tracking error by and risk factor

Contribution to Expected Return/Tracking Error by Risk Factor

- Deviations LBA result in tracking error (TE)

- Most TE comes from corporate credit & equities

- At similar TE, efficient portfolio has higher allocation to BBB corporates, Real Estate, and Hedge Funds

Asset Allocations with Equal Required Capital

Comparison of current portfolio with the equally risky efficient portfolio

	Current Portfolio	Efficient Portfolio
Cash	19.0%	10.0%
Gilts 1-3	17.1%	0.0%
Gilts 3-5	17.1%	22.9%
Corp A+ 1-3	17.1%	23.5%
Corp A+ 3-5	17.1%	0.0%
Corp BBB 1-3	1.8%	27.1%
Corp BBB 3-5	1.8%	5.0%
Public Equity	7.2%	1.4%
Real Estate	1.8%	4.4%
Hedge Funds	0.0%	5.7%
Total	**100%**	**100%**
Expected Return	2.78%	3.87%
Duration	1.95	1.93
Tracking Error	2.1%	2.1%
Required Capital (bn)	8.69	8.69

Contribution to Expected Return/Tracking Error by Risk Factor

Legend: Corp BBB, Corp A+, Real Estate, IR Duration, Public Equity, Hedge Funds

- Efficient portfolio result in 110 bps of additional expected return
- Sources of return are credit risk, and equity, real estate, and hedge funds
- Current portfolio's risk is primarily from equities & credit

❺ Impact of Solvency II – Standard Formula Approach

Standard Formula Approach to Market Solvency Capital Requirement (QIS5)

Left chart: Expected Return (%) vs Required Capital (bn) and Market SCR (bps)
- Expected Return
- Market SCR

Right chart: Market SCR (bps) vs Required Capital (bn)
- Equity
- Liq.Pre
- Interest Rate
- Real Estate
- Credit Spread
- Diversification
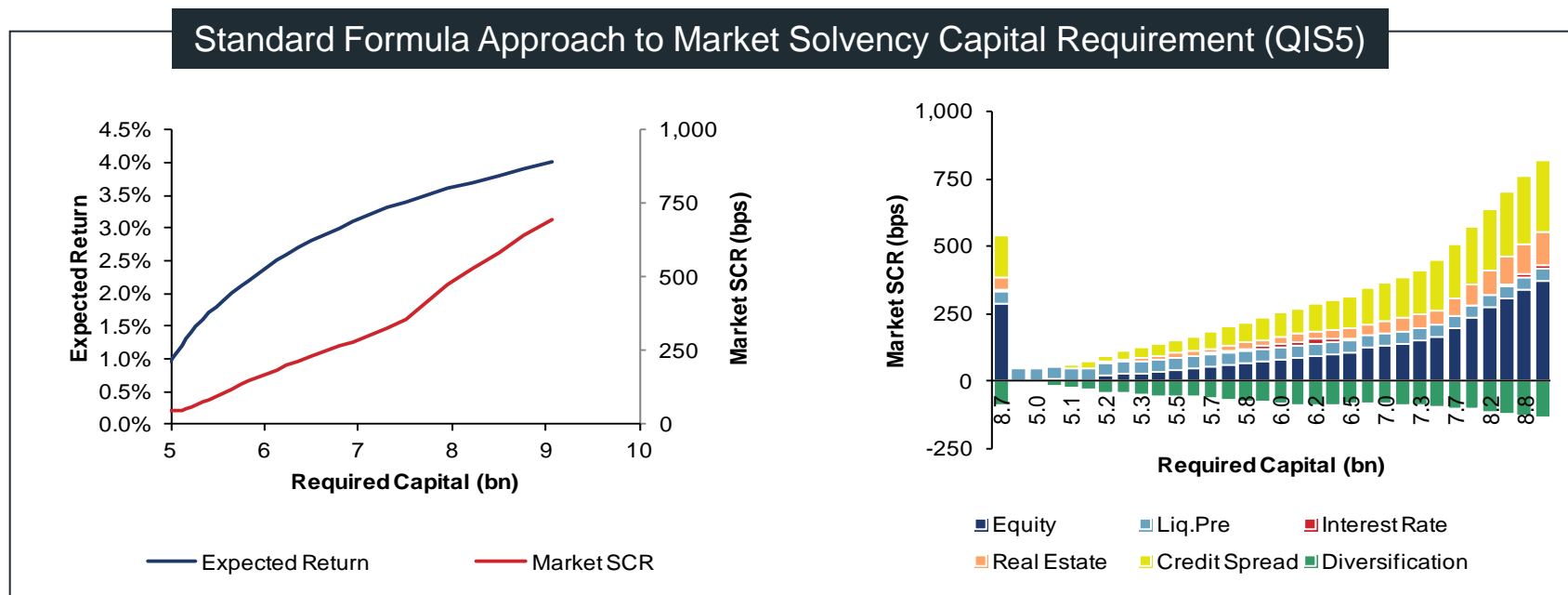
- Standard formula Market SCR is shown for each portfolio on the efficient frontier

- While hedge funds and equities are efficient on an economic basis, the standard formula approach results in quickly increasing Market SCR at higher capital levels

❺ Impact of Solvency II – Modifying SAA Constraints

Standard Formula Approach to Market Solvency Capital Requirement (QIS5)
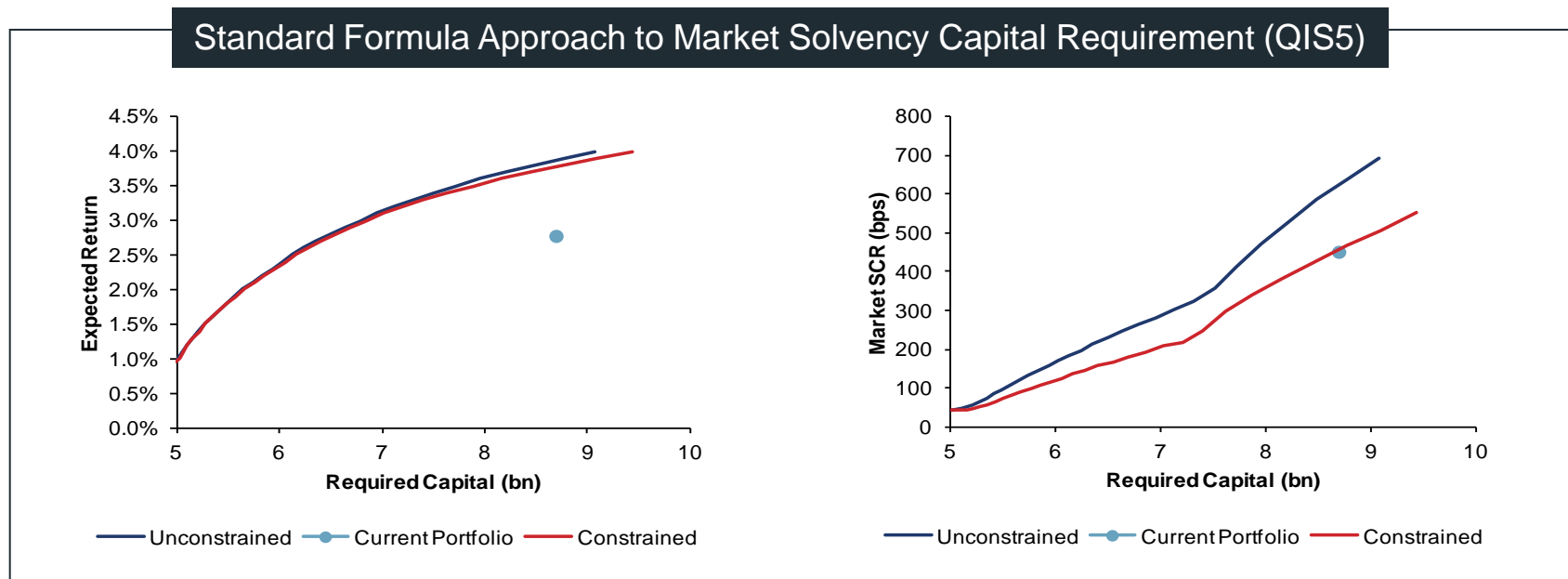
- To better align with the standard formula approach, we impose constraints in the SAA

- This results in a new efficient frontier which is different from the initial unconstrained frontier

Asset Allocations with Equal Required Capital
Comparison of current portfolio with equally risky efficient portfolios

	Current Portfolio	Efficient Portfolio (uncon.)	Efficient Portfolio (constr.)
Cash	19.0%	10.0%	10.0%
Gilts 1-3	17.1%	0.0%	0.0%
Gilts 3-5	17.1%	22.9%	24.0%
Corp A+ 1-3	17.1%	23.5%	24.6%
Corp A+ 3-5	17.1%	0.0%	0.0%
Corp BBB 1-3	1.8%	27.1%	27.2%
Corp BBB 3-5	1.8%	5.0%	4.7%
Public Equity	7.2%	1.4%	1.2%
Real Estate	1.8%	4.4%	7.2%
Hedge Funds	0.0%	5.7%	1.1%
Total	**100%**	**100%**	**100.0%**
Expected Return	2.78%	3.87%	3.77%
Duration	1.95	1.93	1.98
Tracking Error	2.1%	2.1%	2.1%
Required Capital (bn)	8.69	8.69	8.69
Market SCR (bps)	452.0	623.2	455.5

Contribution to Expected Return/Tracking Error by Risk Factor

- Corp BBB
- Corp A+
- Real Estate
- IR Duration
- Public Equity
- Hedge Funds
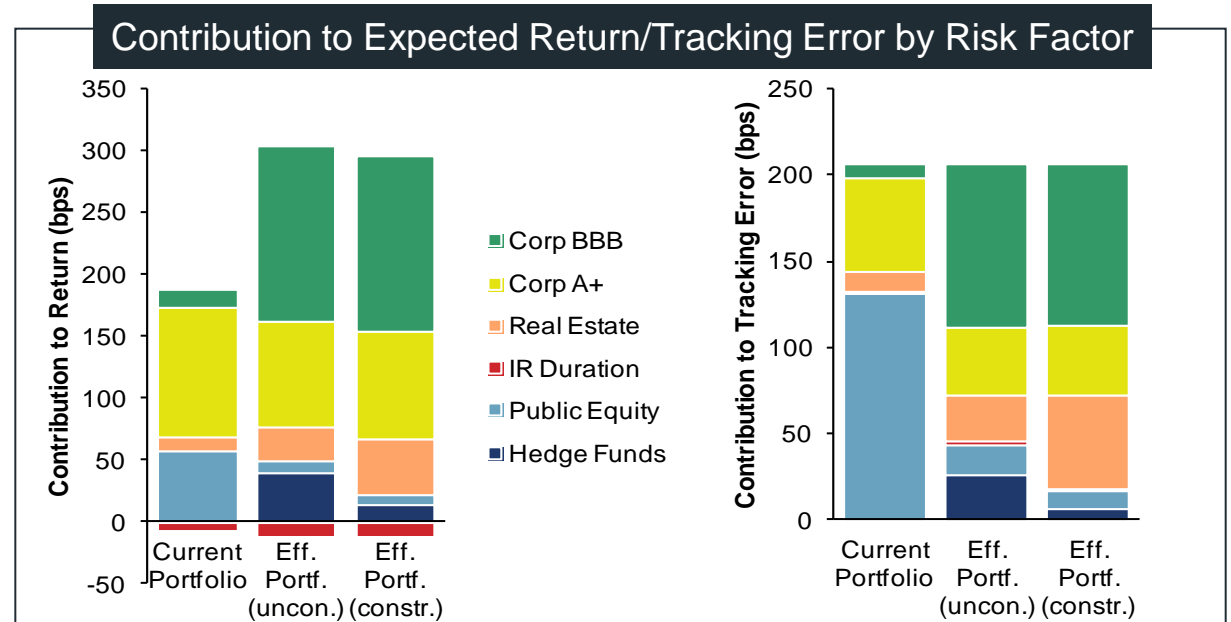
- Constrained efficient portfolio results in 100bps of additional return for the same required capital and Market SCR

Conclusions

- Optimal SAA benefits from diversifying sources of risk
    - Corporate credit
    - Interest rate duration
    - Equity, real estate, and alternatives
- Solvency II market risk may put more/less weight on certain types of risk
- Incorporating constraint to SAA may help achieve more optimal results from a return on capital perspective

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

Disclosures